SCINTIGRAPHIC FUNCTIONAL EVALUATION OF INTRATHECAL DRUG INFUSION DEVICES

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BACKGROUND-AIM

Intrathecal infusion devices are currently used to treat patients with pain and spastic diseases. These devices are made by a pump with a reservoir for the drug allocated in the abdominal subcutaneous space and connected to a catheter ending in the spinal subarachnoid space. When patients require increasing infusion rates or drug amount without clinical benefit, this could be caused by malfunctioning of the infusion system or progression of the disease. Administration of a not-absorbed radionuclide ($^{99m}$Tc-DTPA) in the pump reservoir and sequential scanning allow to follow the progression of the radionuclide from the pump along the catheter to the spinal subarachnoid space. The images show us not only if there is interruption of the progression of the radionuclide along the delivery system but permit us also, in case of programmable devices with known flow rate of the pump, quantitative evaluation of the programmed and effective flow along the delivery system. Aim of this study is to evaluate the effectiveness of the administration of $^{99m}$Tc-DPTA in detecting infusion device malfunctioning and to correlate the results with patient management and outcome.

METHODS

8 patients already studied with $^{99m}$Tc-DTPA scintigraphy were retrospectively reviewed. All pts. had surgically implanted Medtronic® SynchroMed intrathecal (baclofen or ziconotide) infusion pump systems. The indication for implantation was severe spasticity (n=5) and intractable pain (n=3). With standard refill technique 400 MBq of $^{99m}$Tc-DPTA were injected into the pump reservoir. Subsequently planar serial static abdominal scans were performed every three hours to follow tracer progression. Once the tracer arrived in the spinal liquoral system, whole-body scans were performed.

RESULTS

$^{99m}$Tc-DPTA tracer abdominal and spine distribution was studied for 24 hours. No adverse effects on heat conditions correlated with $^{99m}$Tc-DPTA were registered. 1 patient showed regular device functioning without interruption of progression and with delivery flow corresponding to the programmed flow. 6 patients showed interruption of the progression along the abdominal portion of the catheter with 1 patient showing dispersion of the radionuclide in the subcutaneous tissue. 1 patient showed quantitative alteration of the flow rate which was too slow respect to the programmed delivery flow rate. Patients with flow stop were re-operated and operative findings confirmed the scintigraphic findings. The patient with flow reduction presented pump failure. For patient with normal flow psychiatric disorders were confirmed.

CONCLUSION

Intrathecal endoliquoral infusion system scintigraphy is an useful tool in non-invasive evaluation of qualitative and quantitative functioning of intrathecal delivery implants with programmable pump. Use of $^{99m}$Tc-DTPA radionuclide allows satisfactory and good-quality study conduction, without any adverse effects and with lower dosimetric load than $^{111}$In-DTPA.